

Date: February 6, 2004

To: Examiner Nadav
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Fax No. 571-273-1660
Phone No. 571-272-1660

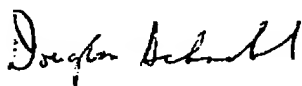
From: Douglas Schnabel
Registered Patent Agent, No. 47,927
George O. Saile & Associates
28 Davis Ave
Poughkeepsie, NY 12603

Fax No. 989-894-4392
Phone No. 989-894-4392

Re: Serial No. 09/898,386 – Docket No. TSMC-00-424

The amendment has been updated to include Claim 9 in the listing of claims per our telephone conversation of February 6, 2004. The updated amendment is attached.

Thanks,



Douglas Schnabel

Fax length: 11 pages plus cover letter

TSMC-00-424

July 30, 2003

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Fr: George O. Saile, Reg. No. 19,572
28 Davis Ave
Poughkeepsie, N.Y. 12603

Subject: | Serial No. 09/898,386 07/05/2001 |
| S.H. Chen |

"DIODE FOR POWER PROTECTION"

Grp. Art Unit: 2811 O. NADAV

RESPONSE PATENT OFFICE ACTION

Dear Sir:

In response to the Office Action dated June 12, 2003 please
amend the above-identified application for patent as follows:

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being
deposited with the United States Postal Service as first
class mail in an envelope addressed to: Commissioner of
Patent and Trademarks, Washington, D.C. 20231, on _____,
2003.

Stephen B. Ackerman, Reg. No. 37,761

Signature _____

Date _____

TSMC-00-424

AMENDMENTS TO THE CLAIMS:

If entered, this listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) An electrostatic discharge protection device consisting of:

a p-well region in a semiconductor substrate;

a ground pad connected to a first p+ region in said

5 p-well region;

an n+ region in said p-well region wherein said n+ region is connected to a first voltage supply;

an n-well region in said p-well region wherein said n+ region is spaced from said n-well region a distance such
10 that a depletion region extends therebetween during normal operation; and

a second p+ region in said n-well region wherein said second p+ region is connected to a second voltage supply of greater value than said first voltage supply during said

TSMC-00-424

15 normal operation wherein current is conducted through said n+ region to said second p+ region during an electrostatic discharge event.

2. (Original) The device according to Claim 1 wherein said p-well region comprises a dopant concentration of between about 1×10^{15} atoms/cm³ and 1×10^{16} atoms/cm³.

3. (Original) The device according to Claim 1 wherein said n-well region comprises a dopant concentration of between about 5×10^{15} atoms/cm³ and 5×10^{16} atoms/cm³ and a junction depth of between about 0.3 microns and 1.0 microns.

4. (Original) The device according to Claim 1 wherein said n+ region comprises a dopant concentration of between about 1×10^{20} atoms/cm³ and 1×10^{22} atoms/cm³ and a junction depth of between about 0.1 microns and 0.3 microns.

5. (Original) The device according to Claim 1 wherein said distance between said n+ region and said n-well region is between about 0.2 microns and 1.0 microns.

TSMC-00-424

6. (Original) The device according to Claim 1 wherein said first voltage supply is between about 1.0 Volts and 5.0 Volts referenced to said p-well region during said normal operation.

7. (Original) The device according to Claim 1 wherein said second voltage supply is between about 1.0 Volts and 5.0 Volts referenced to said p-well region during said normal operation.

8. (Currently Amended) An electrostatic discharge protection device consisting of:

a p-well region in a semiconductor substrate;

a ground pad connected to a first p+ region in said

5 p-well region;

an n+ region in said p-well region wherein said n+ region is connected to a first voltage supply;

an n-well region in said p-well region wherein said n+ region is spaced from said n-well region a distance such

10 that a depletion region extends therebetween during normal operation and wherein said distance between said n+ region and said n-well region is between about 0.2 microns and 1.0 microns; and

TSMC-00-424

a second p+ region in said n-well region wherein said
15 second p+ region is connected to a second voltage supply of
greater value than said first voltage supply during said
normal operation wherein current is conducted through said
n+ region to said second p+ region during an electrostatic
discharge event. The device according to Claim 8 wherein
20 said p-well region comprises a dopant concentration of
between about 1×10^{15} atoms/cm³ and 1×10^{16} atoms/cm³.

9. (Original) The device according to Claim 8 wherein said
p-well region comprises a dopant concentration of between
about 1×10^{15} atoms/cm³ and 1×10^{16} atoms/cm³.

10. (Original) The device according to Claim 8 wherein said
n-well region comprises a dopant concentration of between
about 5×10^{15} atoms/cm³ and 5×10^{16} atoms/cm³ and a junction
depth of between about 0.3 microns and 1.0 microns.

11. (Original) The device according to Claim 8 wherein said
n+ region comprises a dopant concentration of between about
 1×10^{20} atoms/cm³ and 1×10^{22} atoms/cm³ and a junction depth of
between about 0.1 microns and 0.3 microns.

TSMC-00-424

12. (Original) The device according to Claim 8 wherein said first voltage supply is between about 1.0 Volts and 5.0 Volts referenced to said p-well region during said normal operation.

13. (Original) The device according to Claim 8 wherein said second voltage supply is between about 1.0 Volts and 5.0 Volts referenced to said p-well region during said normal operation.

14. (Currently Amended) An electrostatic discharge protection circuit on an integrated circuit device, said protection circuit consisting of:

a ground pad connected ~~to an external ground~~
5 ~~reference and~~ to a first p+ region in a p-well in a substrate;

a first voltage supply pad connected to an external first voltage supply and to an n+ region in said p-well;
and

10 a second voltage supply pad connected to an external second voltage supply of greater value than said external

TSMC-00-424

first voltage supply during normal operation and to a
second p+ region in an n-well region in said p-well region
wherein said n+ region is spaced from said n-well region a
15 distance such that a depletion region extends therebetween
during said normal operation, and wherein current is
conducted through said external second voltage supply pad
to said external first voltage supply pad during an
electrostatic discharge event.

15. (Original) The device according to Claim 14 wherein
said p-well region comprises a dopant concentration of
between about 1×10^{15} atoms/cm³ and 1×10^{16} atoms/cm³.

16. (Original) The device according to Claim 14 wherein
said n-well region comprises a dopant concentration of
between about 5×10^{15} atoms/cm³ and 5×10^{16} atoms/cm³ and a
junction depth of between about 0.3 microns and 1.0
5 microns.

17. (Original) The device according to Claim 14 wherein
said n+ region comprises a dopant concentration of between
about 1×10^{20} atoms/cm³ and 1×10^{22} atoms/cm³ and a junction
depth of between about 0.1 microns and 0.3 microns.

TSMC-00-424

18. (Original) The device according to Claim 14 wherein said distance between said n+ region and said n-well region is between about 0.3 microns and 1.0 microns.

19. (Original) The device according to Claim 14 wherein said external first voltage supply is between about 1.0 Volts and 5.0 Volts referenced to said p-well region during said normal operation.

20. (Original) The device according to Claim 14 wherein said external second voltage supply is between about 1.0 Volts and 5.0 Volts referenced to said p-well region during said normal operation.

TSMC-00-424

REMARKS

Examiner O. Nadav is thanked for the thorough examination and search of the subject Patent Application and for finding allowable subject matter in Claims 14-20. Claims 1, 8, and 14 have been amended.

All Claims are believed to be in condition for Allowance, and that is so requested.

Reconsideration of Claims 1-13 rejected under 35 U.S.C. 112, first paragraph, is requested based on Amended Claims 1 and 8 and the following remarks.

Claims 1 and 8 have been amended to include the following element:

"a ground pad connected to a first p+ region in said p-well region;" (Amended Claim 1, lines 4-5, Amended Claim 8, lines 4-5)

The addition of this element should align the limitations of the Claimed invention to those found in the device described in the

TSMC-00-424

Specification (page 10) and should overcome the rejection. The amendments use the same language agreed on per telephone interview with the Examiner on May 15, 2003. Amended Claims 1 and 8 and dependent Claims 2-7 and 9-13 should therefore be in compliance with 35 U.S.C. 112, first paragraph.

Reconsideration of Claims 1-13 rejected under 35 U.S.C. 112, first paragraph, is requested based on Amended Claims 1 and 8 and the above remarks.

In regards to Claim 14, this Claim has been amended as follows:

a ground pad connected ~~to an external ground reference and~~
to a first p+ region in a p-well in a substrate; (lines 4-6)

Per the telephone interview with the Examiner on May 15, 2003, the above changes broaden Claim 14 yet still remaining within the scope of allowable subject matter.

Applicants have reviewed the prior art made of record and not relied upon and agree with the Examiner that while the

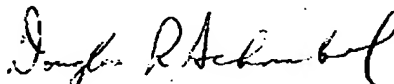
TSMC-00-424

references are of general interest, they do not apply to the detailed Claims of the present invention.

Allowance of all Claims is requested.

It is requested that should Examiner O. Nadav not find that the Claims are now Allowable that he call the undersigned at 989-894-4392 to overcome any problems preventing allowance.

Respectfully submitted,



Douglas R. Schnabel, Reg. No. 47,927